ClimateAsyst®

User Guide

Prepared for:	**Tasmanian Climate Change Office**
Date:	**March 2014** **Rev00**

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Prepared by: _____ **Date: 1 March 2014**
Sven Rand

Reviewed by: _____ **Date: 1 March 2014**
Stuart Attenborrow *pp*

Authorised by: _____ **Date: 1 March 2014**
Stephen Avery

Australian Government

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Tasmanian Government

This material was produced with funding support from the Tasmanian Government's Climate Change Office. The views expressed are the responsibility of the author and are not necessarily those of the Tasmanian Government.

Overview

ClimateAsyst is a free, web-based tool for planners, developers, engineers, farmers and others to assist in understanding climate changes projected for Tasmania.

This user guide provides an overview of ClimateAsyst's functionality, input selection, google maps functionality, legend manipulation and linked information.

ClimateAsyst can be accessed at: http://www.pittsh.com.au/climateasyst/

Background to ClimateAsyst's development

ClimateAsyst was initially developed as a subscriber based tool through contributions from ***pitt&sherry*** in partnership with the Antarctic Climate and Ecosystems Cooperative Research Center (ACE CRC) and support from the Tasmanian Government, local government and other stakeholders.

ClimateAsyst has subsequently been expanded to its current web based format through funding from the Australian Government's Natural Disaster Resilience Program and the Tasmanian Government's Climate Change Office.

Climate change variables included

ClimateAsyst enables analysis of a broad range of climate change variables that have been provided through the Climate Futures for Tasmania project[1] and through coastal inundation mapping developed by the Tasmanian Government.

Climate Futures for Tasmania (CFT) project information

The CFT project variables included are:

- Projected temperature related variables including:
  - Annual average temperatures (average daily, maximum or minimum for example)
  - Frost or warm days (number of days expected with minimum below 2°C or maximum to exceed 30°C respectively)
  - Growing degree days (a measure of agricultural impact of daily temperatures).
- Projected rainfall change including:
  - Effects on long term average and seasonal rainfall
  - Effect on short duration rainfall events from 24to 48 hours.
  - Humidity and evaporation variables.

[1] For more information on the Climate Futures for Tasmania project, please refer to http://www.dpac.tas.gov.au/divisions/climatechange/adapting/climate_futures

The CFT project variables are presented in ClimateAsyst as 10 km grid based model outputs. These projections can be manipulated through choice of projection period, generally with a base period (usually representing the period 1961 to 1990[2]) and three modelled future projection periods. Future projection periods are generally an averaged thirty year interval representing the periods 2010 to 2039, 2040 to 2069 and 2070 to 2099.

CFT information can be presented either as modelled projected values or the calculated difference between selected projection periods, as a number or a percentage change.

Users also have the ability to manipulate the colour legends and data range of CFT information being considered.

Coastal vulnerability (Inundation) mapping

The coastal vulnerability (inundation) mapping included incorporates projected sea level rise and is presented as inundation extents for an estimated 1% annual exceedance probability event. Future periods incorporate the sea level rise allowances as set by the Tasmanian Government from a base year of 2010 and for projections at 2050, 2075 and 2100[3].

Database of knowledge and documents

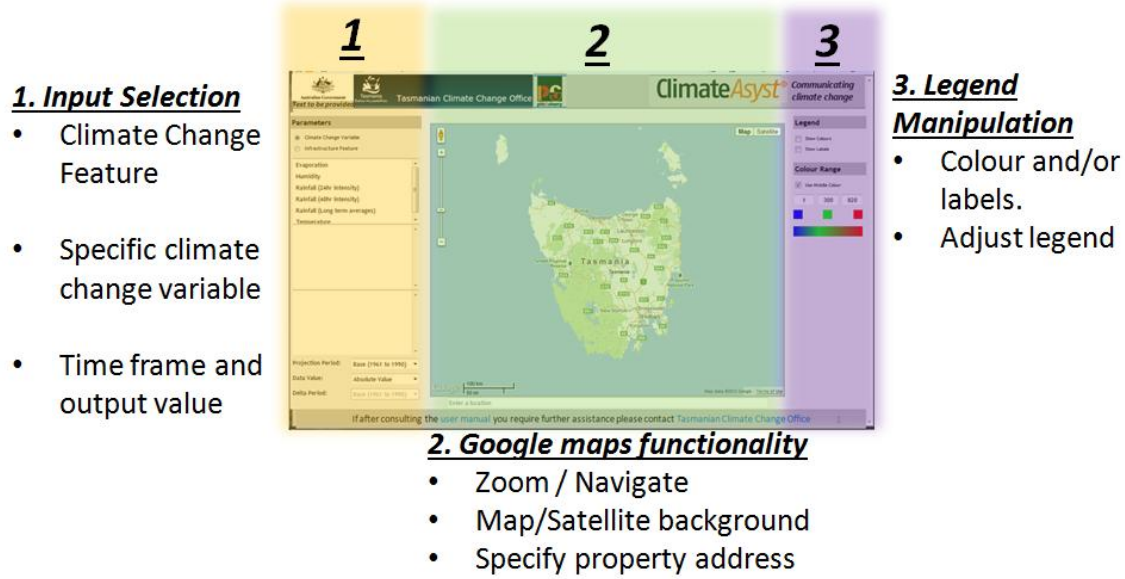
A database of knowledge and documentation is linked to the selected map layer with information on how various climate variables affect infrastructure or other features, such as coastal assets and buildings for example.

[2] Please refer to the Climate Futures for Tasmania project technical reports for further information on the projections and to confirm the base period time frame. The technical reports are available at http://www.dpac.tas.gov.au/divisions/climatechange/adapting/climate_futures

[3] Please refer to the Coastal Inundation Mapping for Tasmania – Stage 2 Technical Report for further information. The technical report is available at http://www.dpac.tas.gov.au/divisions/climatechange/what_the_government_is_doing/new_tools_to_improve_planning_for_sea_level_rise_and_coastal_hazards

1. Overview of functionality

Figure (1-1) presents an overview of the front screen when initially accessed and indicates basic functionality of various components of the tool.



1-1. Functional Areas of ClimateAsyst

As depicted in the above figure, ClimateAsyst provides three main functional areas:

- Input Selection
- Map functionality
- Legend manipulation

Section 2 of the user guide provides more detail on aspects of each of the three functional areas.

1.1 Data sources

All of the gridded data sets presented have been prepared as components of the CFT project, while the coastal vulnerability (inundation) mapping was provided by the Tasmanian Government.

Users are strongly encouraged to review the CFT technical reports, including relevant limitations on the use of the information developed through those projects and presented in ClimateAsyst.

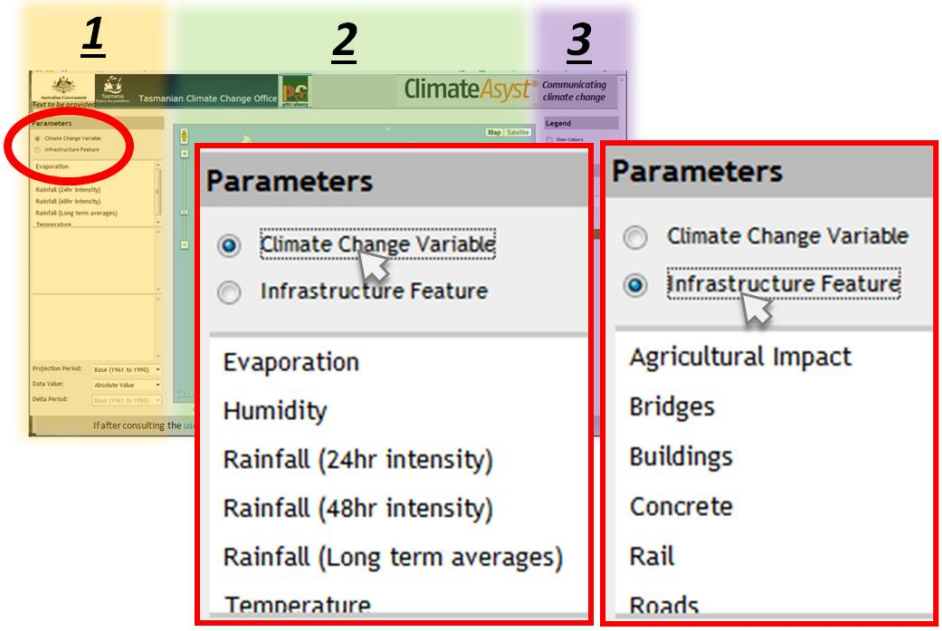
1.2 Climate change scenario

The Climate Futures for Tasmania project investigated changes under the A2 high Greenhouse Gas emissions scenario or alternatively a lower emission scenario B1. Unless stated as a selection option in the climate change variable dataset the information relates to the A2 high greenhouse gas emissions scenario.

The coastal vulnerability (inundation) modelling information presented is derived from the mapping developed by the Tasmanian Government[4] which investigated inundation levels for various likelihood events (annual exceedance probabilities) under current (2010) conditions. Projected sea level rise contributions incorporate the Tasmanian sea level rise planning allowances[5] for the State's coastal areas of 0.2 metres by 2050 and 0.8 metres by 2100. In addition, a projection year of 2075 is provided utilising a 0.4 metre allowance.

2. Input selection

2.1 Input – 'Initial Parameter'



2-1. Initial Climate Change Parameter Selection

[4] Please refer to the Coastal Inundation Mapping for Tasmania – Stage 2 Technical Report for further information. The technical report is available at http://www.dpac.tas.gov.au/divisions/climatechange/what_the_government_is_doing/new_tools_to_improve_planning_for_sea_level_rise_and_coastal_hazards

[5] Further information is available at http://www.dpac.tas.gov.au/divisions/climatechange/what_the_government_is_doing/new_tools_to_improve_planning_for_sea_level_rise_and_coastal_hazards

The first selection choice requires a selection of either Climate Change variable or Infrastructure feature (by mouse clicking on the text as indicated in figure 2-1 above).

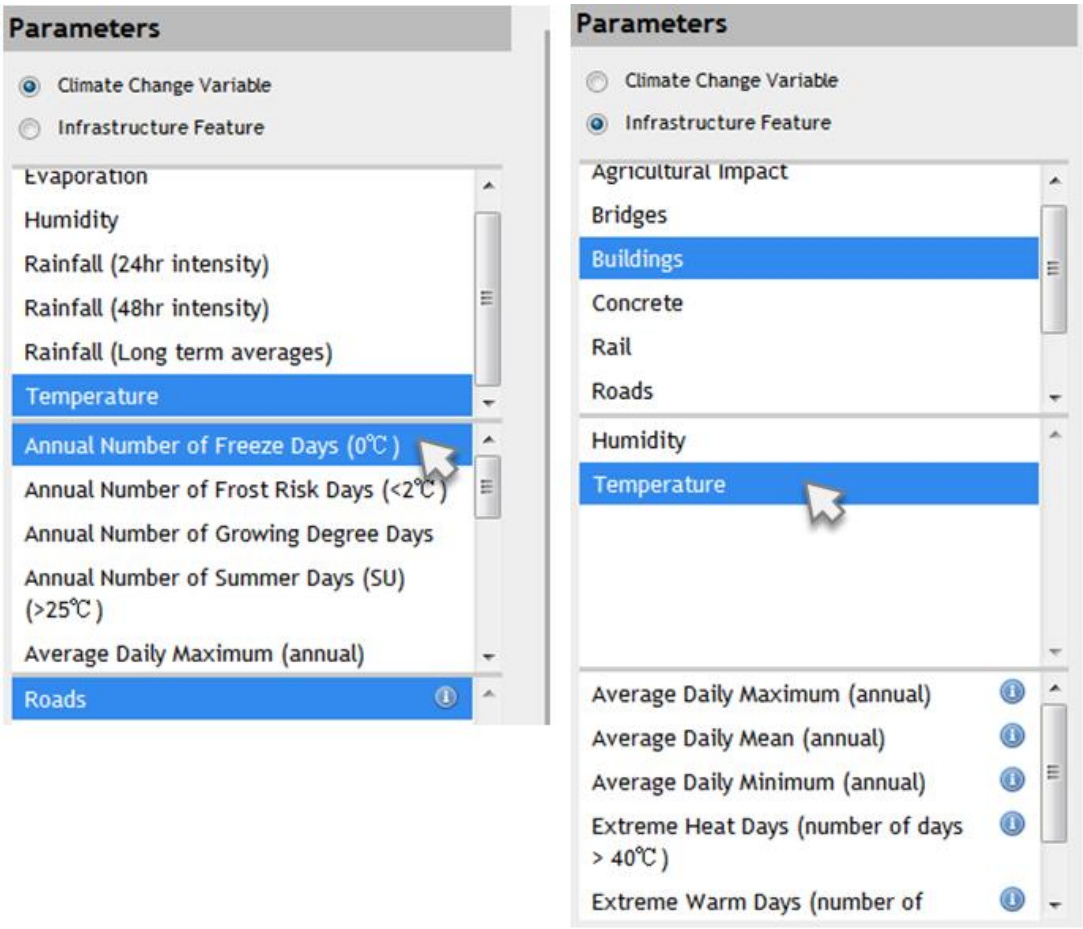
The list below the selection is then populated according to the initial selection and represents either a general list of climate change features or alternatively a list of infrastructure or sectors for which for which specific climate change impacts are identified.

It is anticipated that most users would select the climate change variable option as this initially presents the more comprehensive list of the available climate change outputs.

2.2 Input – 'Specific Variable / Feature'

Following the initial parameter selection users are prompted to select from the list of available climate or infrastructure features (refer to left or right box respectively in figure 2-1 above).

As indicated in the below figure (2-2) selections then populate the respective lists with either climate change variable type, specific feature and then infrastructure or infrastructure feature and indicative climate change variable which may affect it.



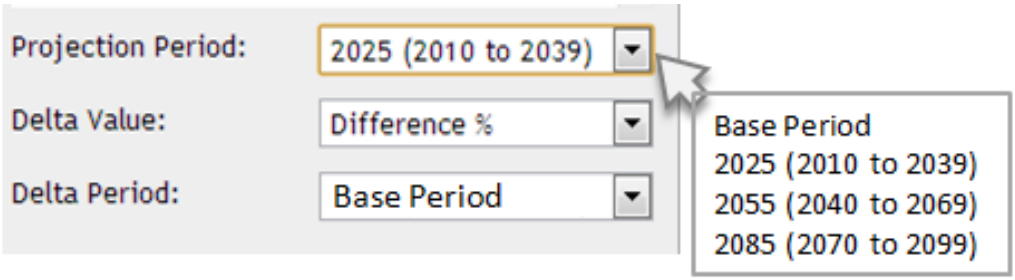
2-2. Initial Selection of Climate Change Variable or Infrastructure Feature

For each of the listed final selections additional information may be accessible (using the blue circled *i* button).

Climate change outputs currently incorporated in the tool include 33 climate change variables.

2.3 Input – 'Projection Period'

For the Climate Futures for Tasmania outputs users can select from one of four projection periods as indicated in Figure 2-3.



2-3. Projection Period Selection

Climate projections have been modelled to provide an average value for a number of specified time intervals. The intervals typically include a base reference modelled on historically observed data which for most variables investigated represents the period 1961 to 1990[6]. The base period was produced with modelled historical data and provides a basis for comparison to future projected periods.

The projected periods are:

- A Base Period, typically 1961 to 1990 in most modelled outputs:
- 2025 (2010 to 2039):
- 2055 (2040 to 2069):
- 2085 (2070 to 2099): Approximating an end of century projection period.

[6] Users should confirm the base period in available supporting information or the original technical reports.

Coastal vulnerability (inundation)

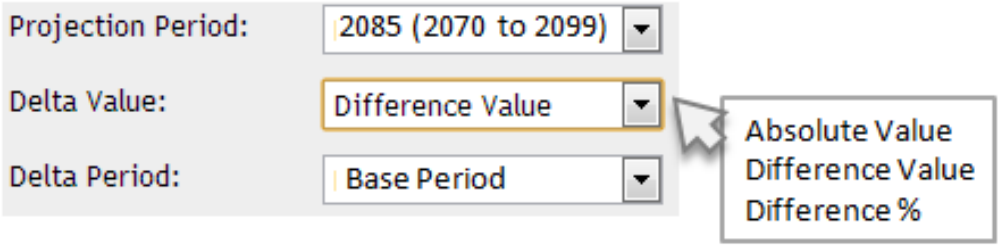
Coastal vulnerability (inundation) mapping is presented as a single combined data overlay indicating the modelled areas inundated during an estimated 1% annual exceedance probability (AEP) event[7] for each of four specific years:

- 2010
- 2050
- 2075
- 2100

The coastal vulnerability (inundation) mapping dataset represents a high resolution overlay[8] on the chosen background image or map. Due to the high resolution nature of the mapping layer the information does not appear when viewing the map at large scales and a slight delay[9] may be experienced when viewing the information.

2.4 Input – 'Difference Value'

The CFT project outputs can be selected from one of three data value options indicated in Figure 2-4.



2-4. Data Value Selection

The map screen colour scale and legend will be automatically generated from this selection.

Absolute Value

Absolute Value represents the raw value as modelled[10] for the projection period. The units relate to the specific variable selected.

Difference Value and Difference %

Selection of Difference Value or Difference % enables a comparison between two nominated projection periods (the Delta Period box becomes selectable when one of these options is selected).

---

[7] For a situation with a constant unchanging sea level this is the inundation 'storm surge tide' level which may be expected to be exceeded on average once every hundred years.
[8] High resolution data requires significant data processing for presentation
[9] when compared to other layers
[10] For further information on the detail of the modelled variables refer to climate futures for Tasmania technical manuals
http://www.dpac.tas.gov.au/divisions/climatechange/adapting/climate_futures

The map overlay is coloured according to the nominated selection where the ***Difference Value*** represents the difference period between the nominated Projection Period (the top box) and the Delta Period (the lower box).

When the ***Difference %*** is selected the map overlay is presented as a percentage difference of the projection period when compared to the delta period[11] (expressed as either a positive or negative change).

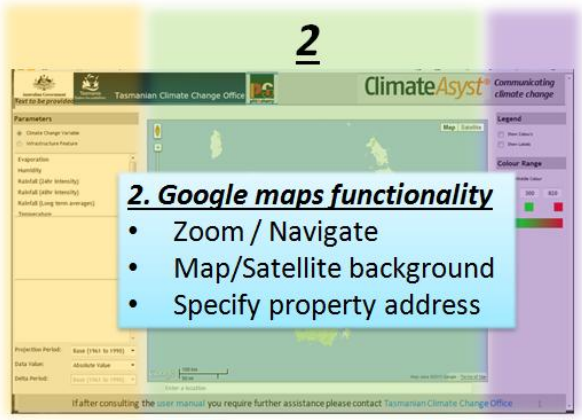
Note: if the projection period and the delta period are the same when presenting differences then no data will be displayed.

Coastal vulnerability (inundation)

The above selections are not enabled for the coastal vulnerability (inundation) dataset which is presented as a series of overlapping polygon areas representing changing inundation levels.

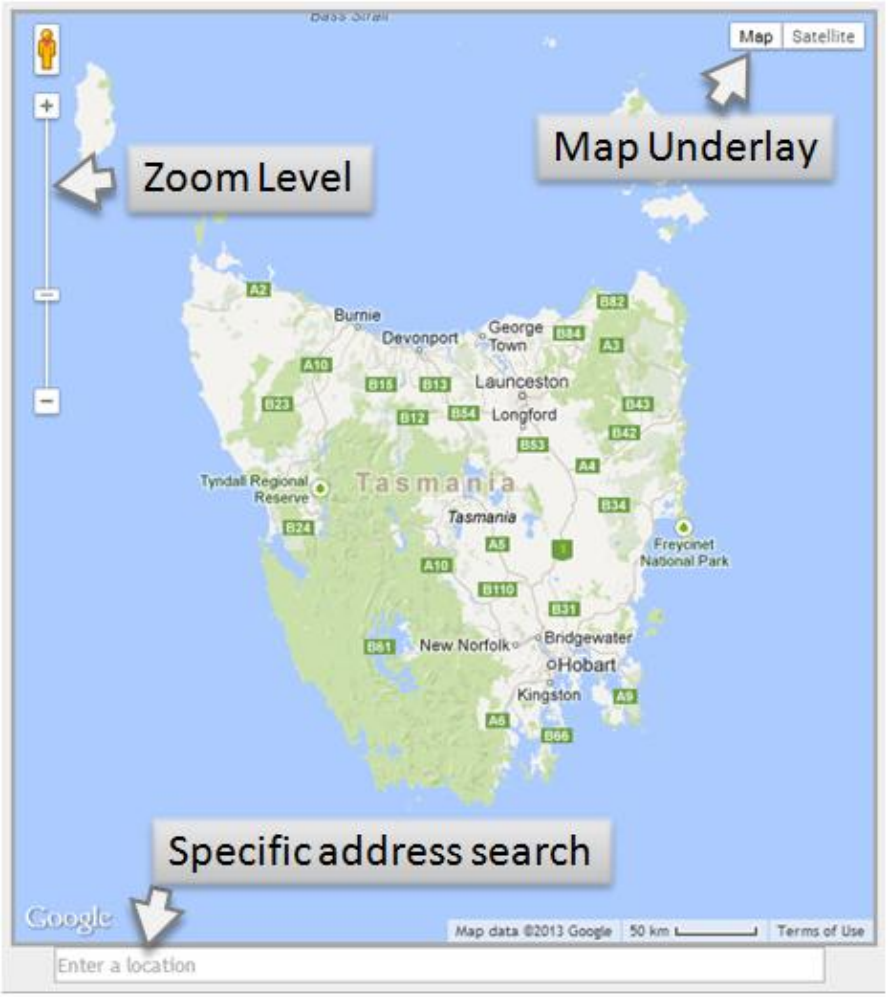
[11]Users should consider the relevance of difference calculations which may not be appropriate for all data sets. For example a percentage change in daily temperature expressed as degrees Celcius (as per the data presented) would be very different if the temperature variable was expressed in degrees Kelvin or Fahrenheit.

3. Google maps functionality



3-1. Google Map Functionality Section

The map overlays are presented on a current version of the Google Maps web interface.



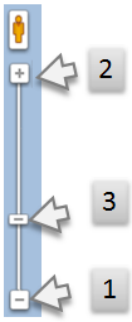
3-2. Google Maps Functionality

The following section describes basic functionality of the map view[12] for the three elements indicated above:-

- Zoom Level
- Map Underlay
- Specific Address search

3.1 Zoom level

The maps interface provides a number of methods for zooming in and out on specific features of interest.



3-3. Adjust Map Zoom Level

1. Left mouse click on the – button at the lower end of the zoom scale to zoom the map out to a larger scale (see a larger area) or alternatively
2. Select the + button to zoom in for more detail.
3. Changing the zoom level is also possible through selection by left mouse click and holding the zoom bar and dragging the bar up to zoom in for more detail or down for a greater area.
4. Double clicking with left mouse button zooms in and
5. Double clicking with right mouse button zooms out

Alternatively, rotating the mouse central wheel will also alter the zoom level.

3.2 Panning the map

Simply clicking and holding the left mouse button within the map image enables the map window to be dragged without adjusting the map scale.

[12] Fort advanced help in Google Maps functionality users are referred to http://support.google.com/maps/bin/answer.py?hl=en&answer=144352

3.3 Map / Satellite

Select either Map or Satellite to choose the underlying imagery in Google Maps.

3.4 Street view

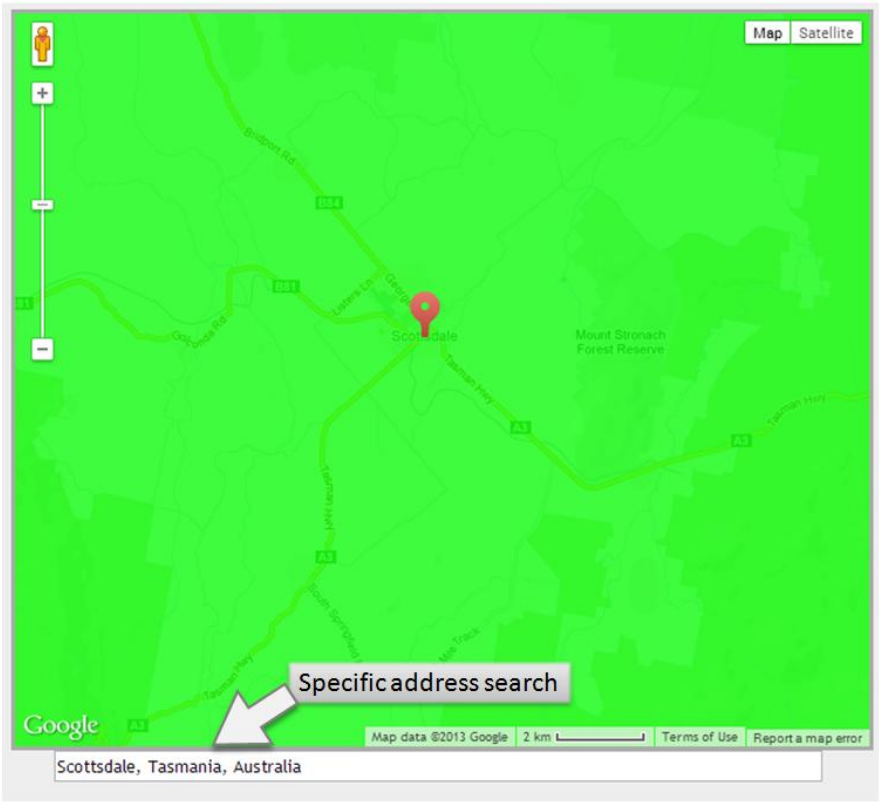
3-4. Street View Image Selection

Street view functionality, while enabled in ClimateAsyst to present Google street view functionality, does not incorporate climate change projection information.

Select the close box in the top right hand corner of a street view image to return to the map overlay view.

3.5 Specific address selection

Google maps provides functionality to rapidly zoom to specific locations or property addresses (figure 3-5).



3-5. Specific Location Search

Simply type in the property or location of interest and select the option returned from the Google search.

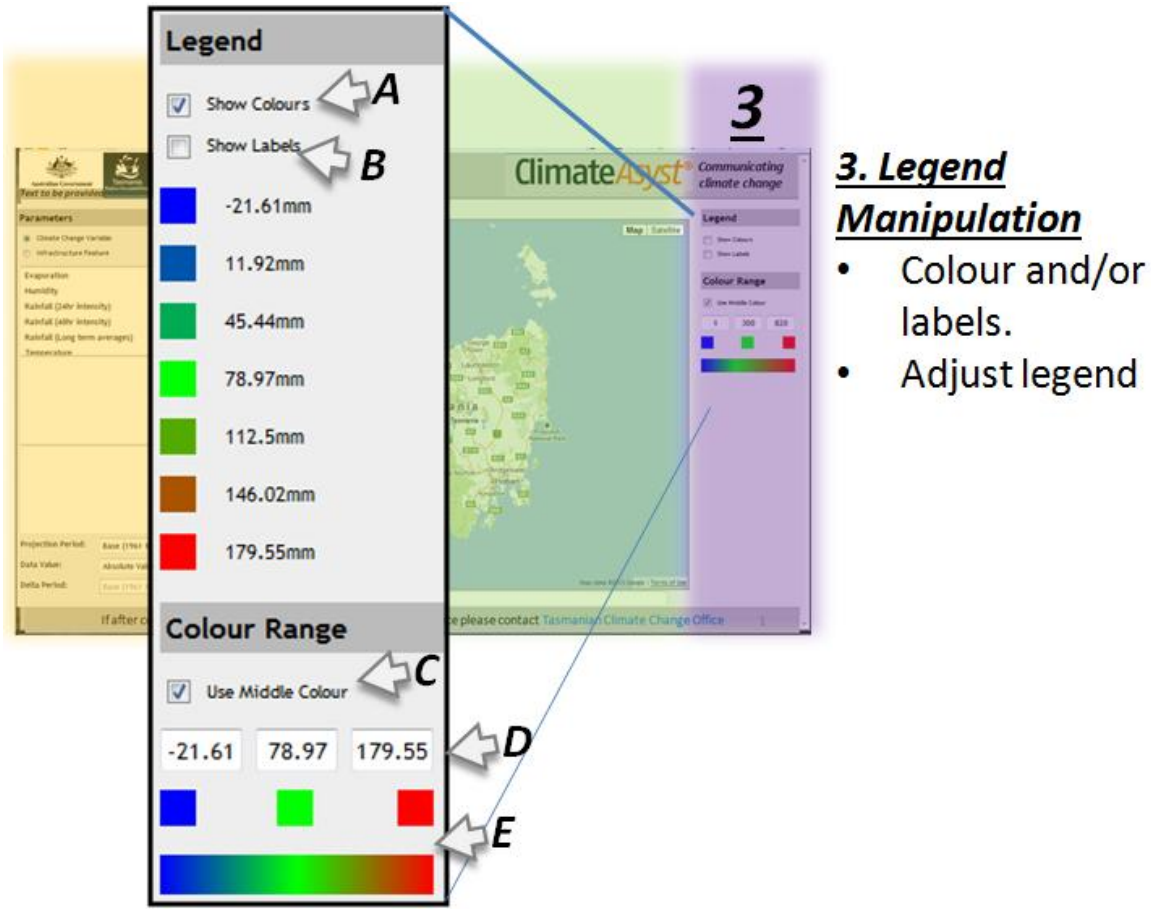
4. Legend manipulation

ClimateAsyst provides a variety of methods to manipulate the presentation of data on the map.

Depending on initial selections, the legend presentation is automatically set to the limits of the selected climate feature data.

Changing the values used for the legend scale or changing the colours used will affect how the colours are shown in the cell data. By changing the middle value you can offset at what point the colour transitions through the middle colour.

The area for selecting these options is indicated in figure 4-1 below.



4-1. Legend Manipulation Section

'Show Colours'
When a climate feature is selected, the map will be highlighted with a number of coloured cells. Turn this option off if you want to see the map without colours (or with labels instead). Selection labelled A in figure 4-1 above.

'Show Labels'
When a climate feature is selected, the map will be highlighted with a number of coloured cells. The value for each cell can be shown in the map by selecting this option. Selection labelled B in figure 4-1 above.

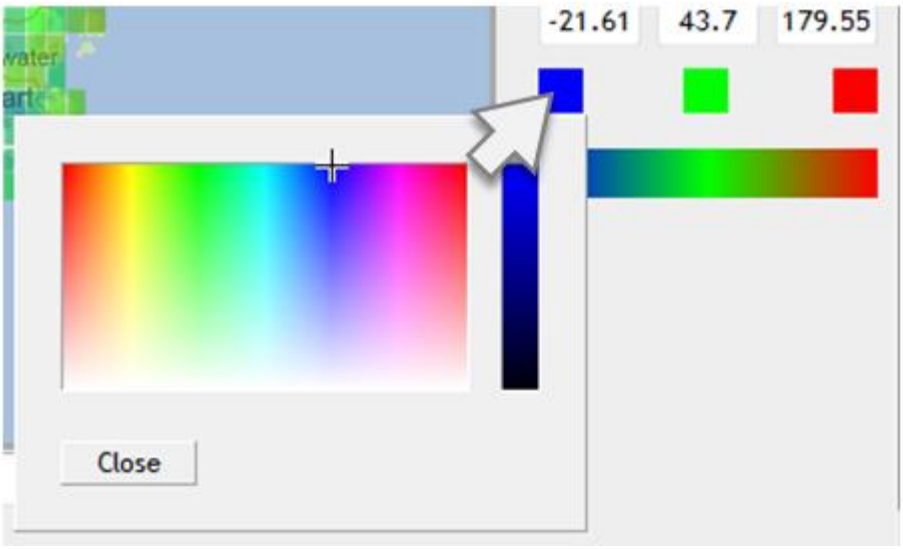
'Use Middle Colour'
When selected, a third colour will be available to make it easier to highlight transitions in values of the cells. Selection labelled C in figure 4-1 above.

'Value Range'
These are automatically set to the limits of the selected climate feature data but can be manually varied. Changing these values will affect how the colours are shown in the cell data. By changing the middle value you can offset at what point the colour transitions through the middle colour. Selection labelled D in figure 4-1 above.

Choosing a narrower range than the entire dataset will produce dark non-coloured cells where these correspond to values outside the selected range.

'Colour Swatches' and Gradient
The colour of the legend can be varied by selection in the area labelled E in figure 4-1 above. The horizontal bar shows the full range of colours selected. If the middle colour is in use, clicking on this bar will allow you to alter the transition through this colour.

Click on these boxes to change the colour gradient as indicated in figure 4-2 below.



4-2. Legend Manipulation - Colour Swatches

Altering the legend colour enables variation of colours to better highlight transitions in the data, to provide more contrast to transitions or alternatively to 'reverse' the colour gradient.

Coastal vulnerability (inundation)

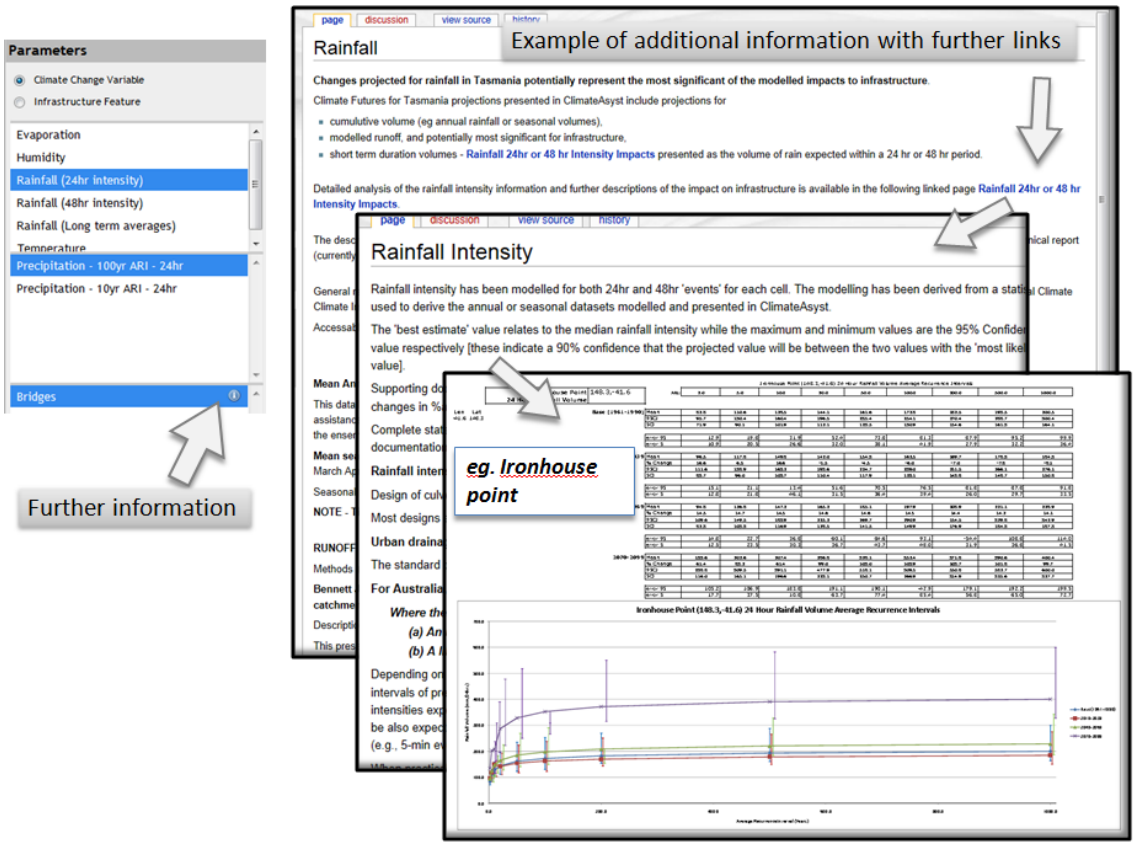
The above selections are not enabled for the coastal vulnerability (inundation) dataset which is presented with preset legend s for the series of overlapping polygon areas representing changing inundation levels.

5. Linked information

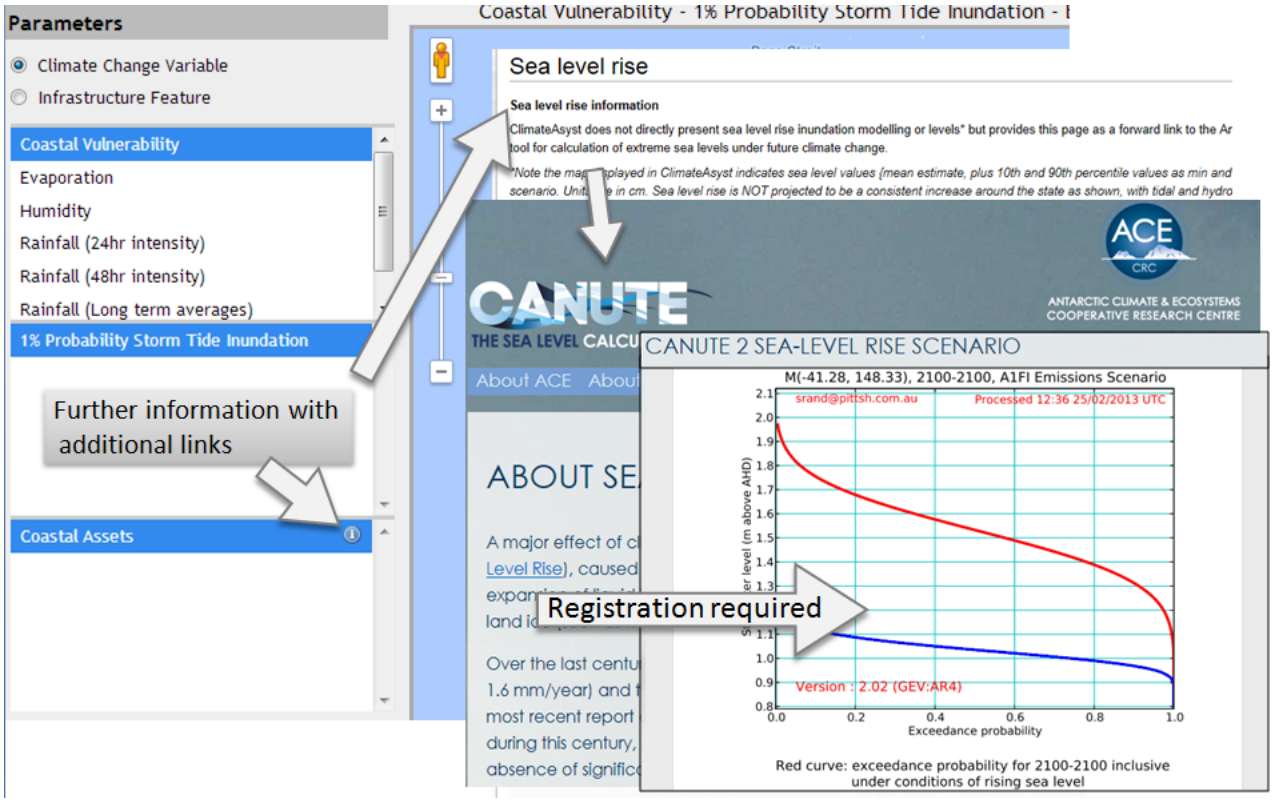
When the information button is selected (refer to section 2.2) further information available is presented in a new web window.

Two examples are provided of additional information available from the linked datasets (figures
5-1 and 5- 2 following):

- Short duration rainfall events and also
- Sea level rise inundation levels):


Parameters
Climate Change Variable
Infrastructure Feature
Evaporation
Humidity
Rainfall (24hr intensity)
Rainfall (48hr intensity)
Rainfall (Long term averages)
Temperature
Precipitation - 100yr ARI - 24hr
Precipitation - 10yr ARI - 24hr
Bridges
Further information
Example of additional information with further links
Rainfall
Changes projected for rainfall in Tasmania potentially represent the most significant of the modelled impacts to infrastructure.
Climate Futures for Tasmania projections presented in ClimateAsyst include projections for
cumulative volume (eg annual rainfall or seasonal volumes),
modelled runoff, and potentially most significant for infrastructure,
short term duration volumes - Rainfall 24hr or 48 hr Intensity Impacts presented as the volume of rain expected within a 24 hr or 48 hr period.
Detailed analysis of the rainfall intensity information and further descriptions of the impact on infrastructure is available in the following linked page Rainfall 24hr or 48 hr Intensity Impacts.
Rainfall Intensity
Rainfall intensity has been modelled for both 24hr and 48hr 'events' for each cell. The modelling has been derived from a stati
used to derive the annual or seasonal datasets modelled and presented in ClimateAsyst.
The 'best estimate' value relates to the median rainfall intensity while the maximum and minimum values are the 95% Confide
value respectively [these indicate a 90% confidence that the projected value will be between the two values with the 'most like
value].
eg. Ironhouse point
Ironhouse Point (148.3,-41.6) 24 Hour Rainfall Volume Average Recurrence Intervals

5-1. Example of Additional Information Available Relating to Rainfall Impacts


Parameters
Climate Change Variable
Infrastructure Feature
Coastal Vulnerability
Evaporation
Humidity
Rainfall (24hr intensity)
Rainfall (48hr intensity)
Rainfall (Long term averages)
1% Probability Storm Tide Inundation
Coastal Assets
Further information with additional links
Coastal Vulnerability - 1% Probability Storm Tide Inundation
Sea level rise
Sea level rise information
ClimateAsyst does not directly present sea level rise inundation modelling or levels* but provides this page as a forward link to the Ar
tool for calculation of extreme sea levels under future climate change.
CANUTE
THE SEA LEVEL CALCU
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ABOUT SE
CANUTE 2 SEA-LEVEL RISE SCENARIO
M(-41.28, 148.33), 2100-2100, A1FI Emissions Scenario
srand@pittsh.com.au
Processed 12:36 25/02/2013 UTC
Registration required
Version : 2.02 (GEV:AR4)
Exceedance probability
Red curve: exceedance probability for 2100-2100 inclusive under conditions of rising sea level

5-2. Additional Information Relating to Coastal Vulnerability (ACE CRC – Canute Calculator)

transport | community | industrial | carbon & energy

Brisbane
2nd Floor
276 Edward Street
Brisbane QLD 4000
T: (07) 3221 0080
F: (07) 3221 0083

Canberra
Tower A, Level 5
7 London Circuit
Canberra ACT 2601
T: (02) 6295 2100
F: (02) 6169 4100

Devonport
1st Floor
35 Oldaker Street
PO Box 836
Devonport TAS 7310
T: (03) 6424 1641
F: (03) 6424 9215

Hobart
GF, 199 Macquarie Street
GPO Box 94
Hobart TAS 7001
T: (03) 6210 1400
F: (03) 6223 1299

Launceston
4th Floor
113 - 115 Cimitiere Street
PO Box 1409
Launceston TAS 7250
T: (03) 6323 1900
F: (03) 6334 4651

Melbourne
Level 1, HWT Tower
40 City Road, Southbank VIC 3006
PO Box 259
South Melbourne VIC 3205
T: (03) 9682 5290
F: (03) 9682 5292

Sydney
1st Floor
56 Clarence Street
Sydney NSW 2000
T: (02) 8216 4700
F: (02) 8216 4747

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E: info@pittsh.com.au
W: www.pittsh.com.au

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